Marvyn Inga

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Education

Ph.D. in Physics — São Paulo, Brazil
University of Campinas - UNICAMP — *2015 - Current*

M.Sc. in Physics — São Paulo, Brazil
University of Campinas - UNICAMP — *2013 - 2015*

B.Sc. in Physics — Lima, Peru
National University of Engineering - UNI — *2006 - 2012*

Summary

- Experience working with optics and photonics, with emphasis on the experimental work.
- Strong capacity to design science experiments and automate sophisticated instruments.
- Proficient in a variety of specialized computer programs to acquire, analyze, and visualize data.
- Considerable experience teaching students at the undergraduate level.

Languages

Spanish Native

Portuguese Fluent

English Professional

Projects

Kerr optical frequency comb generation in silica microresonators

UNICAMP, 2016-2020

Optical frequency combs (OFCs) are more elegant, energy-efficient and integrated light sources consisting of a series of discrete equally spaced lines in the frequency domain. OFCs can be used for frequency metrology, precision spectroscopy, distance measurement or telecommunications, just to name a few applications. In this project, we engineered the group velocity dispersion of silica microresonators with the intention to generate more suitable OFCs via nonlinear effects. For example, in wedge microresonator we did it by controlling its sidewall angle without affecting significantly the free spectral range. In spherical microresonator, we used ALD alumina coating of different thicknesses with the same intention. We reported both methods in scientific international journals like Optics Letters and APL Photonics. My contribution to this project was principally in the experimental work, automating instruments, acquiring and analyzing data. Also, I wrote Python scripts with different objectives like identifying and characterizing all mode families through their quality-factors, or analyzing the dispersion of the microresonators from dense optical spectra. In conclusion, this project was an excellent opportunity to acquire new knowledge and skills to fabricate silica microresonators, simulate optical modes, communicate equipment from our hardware, process AFM images, analyze millions of data point, and optimize processes using several Python libraries.

Tunable light filters

SAMSUNG & UNICAMP, 2017

It was a partnership between SAMSUNG and the Device Research Laboratory (LPD-Unicamp) where I participated in contributing to the colour theory transformations and algorithms necessary to identify colors emitted by the homemade filters. For this, I used an spectrometer and a Python package for colour science.

High sensitivity spectroscopy

UNICAMP, 2014-2015

In this project, I demonstrated the possibility of using optical cavities of moderate finesse for measurements of small absorption coefficients of nearly transparent liquid and solid samples. With this sensitive technique, based on measurements of ring-down times, I isolated the absorption coefficient of liquids contained inside a transparent cuvette oriented at Brewster's angle. This project was important to acquire experience working on spectroscopy and free-space optics. Link in portuguese

Magnetic properties of CuO_2 nanoparticles on graphite and graphene UFABC, 2012

Here, I focused on obtaining graphene from highly oriented graphite blocks using the scotch tape method. Afterwards, we obtained nanoparticles by laser ablation and deposited on graphene samples. The optical and magnetic characterization of the samples were done with the intention of detect changes in their properties.

Publications

Journals

- M. Inga, L. Fujii, J. M. da Silva Filho, J. Quintino, A. Ferlauto, F. C. Marques, T. P. M. Alegre, and G. S. Wiederhecker. Alumina coating for dispersion management in ultra-high Q microresonators. *APL Photonics* 5, 116107 (2020). This article was chose by the editors as a Featured Article.
- L. Fujii, M. Inga, J. H. Soares, Y. A. V. Espinel, T. P. Mayer Alegre, and G. S. Wiederhecker. Dispersion tailoring in wedge microcavities for Kerr comb generation. *Optics Letters* Vol. 45, Issue 12, pp. 3232-3235 (2020).

Conferences

- M. Inga, L. F. dos Santos, J. M. C. da Silva Filho, Y. A. V. Espinel, F. C. Marques, T. P. M. Alegre, and G. S. Wiederhecker. Tailoring group-velocity dispersion in microspheres with alumina coating. In *CLEO*, pp JTh2C.4. Optical Society of America (2020).
- L. Fujii, M. Inga, J. H. Soares, T. P. Mayer Alegre, and G. S. Wiederhecker. Dispersion Control in Silicon Oxide Wedge Microdisks. In *CLEO*: QELS Fundamental Science, pp. JTu2A-111. Optical Society of America (2018).

Sharing and curation of data and software

- M. Inga, L. Fujii, J. M. da Silva Filho, J. Quintino, A. Ferlauto, F. C. Marques, T. P. M. Alegre, and G. S. Wiederhecker. (2020). Dataset and Simulation Files for article "Alumina coating for dispersion management in ultra-high Q microresonators" (Version v1.0) [Data set]. Zenodo.

Teaching Experience

Electric Circuits and Electromagnetism UNIVESP, 2019-II

Employed on a temporary contract by the UNIVESP in teaching-related responsibilities.

Experimental Physics IV: Alternating Current and Optics UNICAMP, 2015-II, 2016-II

Participating in the Docent Training Stage Program at UNICAMP.

Experimental Physics III: Electricity and Magnetism UNICAMP, 2014-II, 2016-I

Participating in the Docent Training Stage Program at UNICAMP.

Professional Affiliation

Optical Society of America (OSA) 2007-Current

Founder member of the OSA Student Chapter UNI, Lima, Peru. Currently, as a member of the OSA Student Chapter UNICAMP, São Paulo, Brazil.

Computer skills

- I use Latex or Google Docs for scientific reports and Mendeley as a reference manager. To design and edit vectorial images, I use Inkscape. Frequently, my presentations have been done in Impress or Google Slides.
- I use pyVISA and pyQt to control instruments and automate experiments. For data exploration and visualization, I use Jupyter notebooks, Pandas, Numpy, Scipy, Sympy, and Matplotlib. Specific problems always will require the use of specialized Python packages.
- I use preferentially Linux as a development and production environment.
- I have a strong preference for open-source software, but if I have access to competitive proprietary software like Comsol, Mathematica or Matlab, I will be able to use them too.
- I usually use Microsoft Teams for communication and collaboration.

Interests

- Microcomb technology
- Optical sensing
- Biophotonics
- Optical spectroscopy
- Data Analyst
- 5G Technology
- Digital innovation
- Smart cities

References

Two professors with whom I have worked very closely are:

Dr. Gustavo Wiederhecker Professor at Device Research Laboratory - UNICAMP. gsw@unicamp.br

Dr. Carmen Eyzaguirre Professor at Optics and Photonics Laboratory - UNI. ceyzaguirre@uni.edu.pe